Chapter 2 - State of the Kawkawlin River Watershed

Watershed Characteristics

Geographic Setting

The Kawkawlin River is 37 miles long when following the Main and North branches, with 450 miles of tributary watercourses and a watershed area of nearly 225 square miles in Bay, Midland, Gladwin, and Saginaw Counties (Figure 2.1). Elevations in the watershed range from 580 feet at Lake Huron (Saginaw Bay) to 805 feet above mean sea level in the upper reaches of the North Branch of the Kawkawlin. Current municipal project partners within the KRW include the municipalities listed below, which border the Kawkawlin River:

- Bangor Township
- Beaver Township
- Garfield Township
- Kawkawlin Township
- Monitor Township
- Mt. Forest Township
- Williams Township

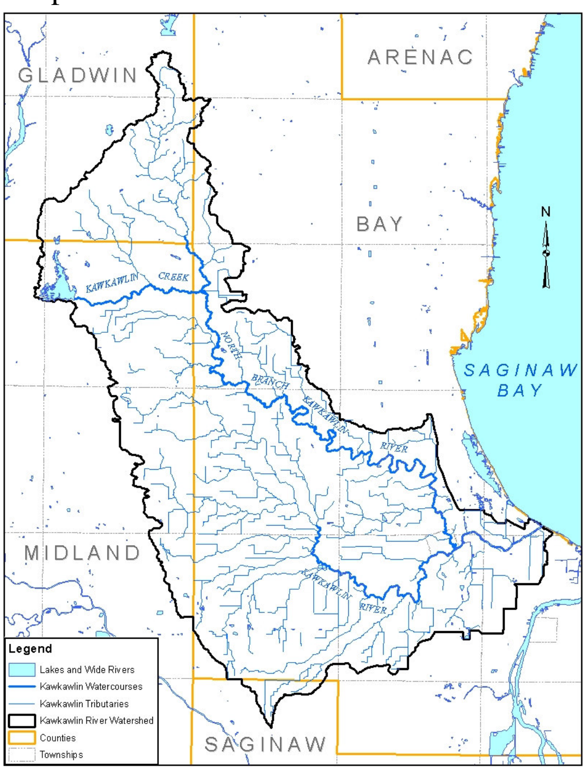

Figure 2.1 Kawkawlin River Watershed

Physical and Natural Features

The Kawkawlin River is actually formed by the combination of two tributaries with entirely different characteristics. The North Branch which is approximately 37 miles long begins at the Kawkawlin Creek impoundment in Gladwin and Midland Counties, and drains an area that is heavily forested. The North Branch contains a rocky bottom that supports the spawning of a variety of fish species, most notably walleye. The meandering North Branch has a moderate gradient and flows fairly swiftly during most months of the year.

The South Branch with a length of about 12 miles, tends to flow more slowly and has very little fall, this branch drains the agricultural and moderate urbanized areas of Bay and Saginaw Counties. These two tributaries come together near the village of Kawkawlin to form the main branch of the Kawkawlin River which then flows approximately 4.5 miles to the Saginaw Bay. The main branch flows through an urbanized area (Kawkawlin River Conservation Partnership).

Hydrology

The watershed has approximately 37 miles of riverine waterways and over 450 miles of tributaries and established county drains which drain into the river. The development of drains, ditches, and field tile systems has served to increase flow velocities and volumes in surface and storm water drainage systems. This region of Michigan averages about 27.1 inches of precipitation annually based on 36 years of complete data from 1931 to 1978.

The only stream flow data is for the North Branch (HUC 04080102) with a drainage area of about 101 square miles upstream of the former USGS gage. The gage has records for the period of 1951 to 1982. The highest peak flow recorded was on May 18, 1974 at a rate of 1,610 cubic feet per second (cfs). The lowest recorded annual peak was 128 cfs on May 4, 1964. The highest annual flow rate average was 130.9 cfs in 1976 and the lowest recorded annual average was 5.86 cfs in 1977. As expected the lowest monthly statistics of discharge in the months of July (14 cfs), August (5.2 cfs), September (10 cfs) and October (14 cfs). The peak discharge months are March (185 cfs), April (188 cfs) and May (103 cfs) which correlates with snowmelt and spring runoff conditions as experienced in the watershed.

Groundwater recharge rate for the Kawkawlin River is estimated to be in the range of 4.9 inches per year (SIR 2005-5284). One of the priorities of the project is to evaluate the waterways and provide recommendations to improve water quality conditions but maintain drainage functions. The base flow needs improvement to help with water quality issues in the watershed, but it is difficult to improve this function based on the direction the land use has moved over the last hundred years. Efforts will be made to help improve baseflow but it may never return to pre-settlement status. This plan will make an effort to provide landowners with information and incentives for everyday management of activities and to lessen environmental impact in the watershed.

Land Use and Land Cover

Land use in the Kawkawlin River watershed is predominately agricultural, with the northern portion of the Watershed being heavily forested as shown in figure 2.2 and detailed in table 2.1. Recreational use in the watershed includes hunting, fishing, and boating. Boating activities along the lower reaches of the Kawkawlin River plays a big role in the local economy.

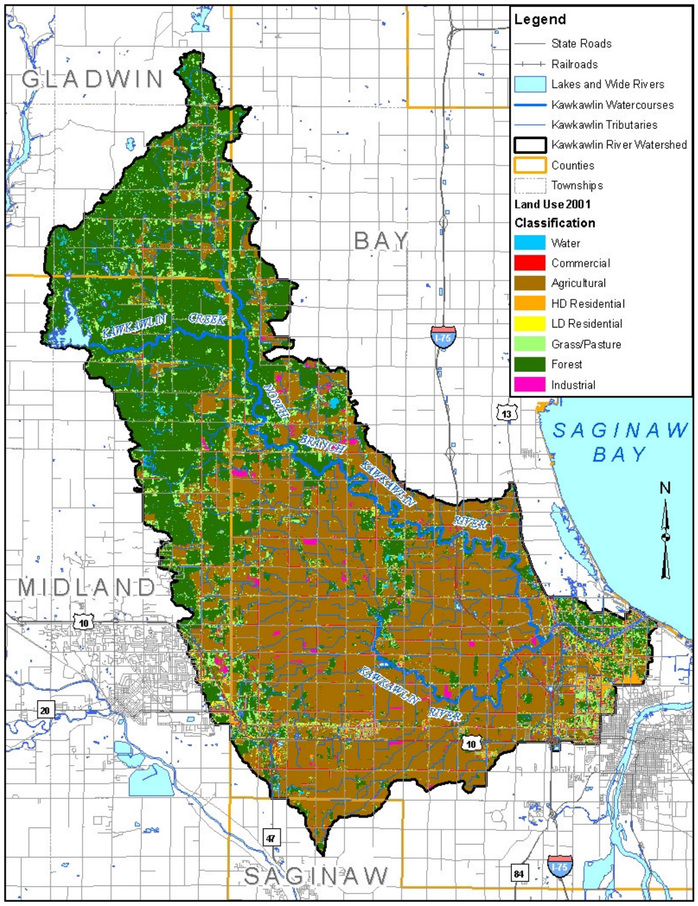

Figure 2.2 Kawkawlin River Watershed Land Use

LAND USE	NORTH BRANCH KAWKAWLIN RIVER	SOUTH BRANCH KAWKAWLIN RIVER
Urban	2.6%	12.6%
Agriculture	43.1%	73.3%
Forested	40.2%	7.5%
Water	0.1%	0.3%
Nonformal	6.1%	4.7%
Wetland	7.9%	1.6%

Table 2.1 Kawkawlin River Watershed Land Use Saginaw Bay/River RAP 1994

Demographic Characteristics

The watershed encompasses a total of 225 square miles. That includes four counties, three cities, 14 townships and has over 30 stakeholder groups interested in restoration of this watershed. The population density of the area is very light. The surrounding township populations and their contributing area to the watershed are shown in Table 2.2.

TOWNSHIP	POPULATION	CONTRIBUTING AREA
Bangor	15,547	To be added
Monitor	10,037	To be added
Kawkawlin	5,104	To be added
Williams	4,492	To be added
Beaver	2,806	To be added
Garfield	1,775	To be added
Mt. Forest	1,405	To be added

Table 2.2 Township Populations and Contributing Areas

Geomorphology

The watershed consists of flat, lacustrine clay soils that have been artificially drained for agricultural purposes. A thorough geomorphic assessment has not been completed at this time. Most of the tributaries and portions of the main channel have been dredged or maintained over the last several decades. In large part, the tributaries consist of straight, deep, trapezoidal channels capable of containing relatively large storm flows.

Natural sections of the main branches of the Kawkawlin, as well as the relatively undisturbed tributaries, would be considered to be C or E type channels if using the Rosgen (1996) classification system. These channels are distinguished by their wide floodplains that are inundated during smaller storm events (1-5 year).
The topography of the Saginaw Bay watershed is a primarily produced from historical glacial and post-glacial processes. The region is classified as lake plain and consists of limestone, coal, shale and sandstone. Under the topsoil are clay sediments over most of the region. There are sand plains ranging in depth from 5 to 10 feet and widths of several miles which were deposited by glacial streams and to this day serve as stream beds for the regions existing rivers. In comparing aerial photography of 1938 to 1998 and overlaying a survey of the center line of the Main, South and North branches of the Kawkawlin it was noted there has been little change in channel location brought about by natural processes of erosion and sinuosity.

Soils in the Watershed

The soil types that are specific to the Kawkawlin watershed are primarily Tappan-Londo-Poseyville association, Londo-Tappan association, Wixom-Pipestone-Tappan association and Pipestone-Tobico-Rousseau association. The Tappan-Londo-Poseyville association are found in nearly level, somewhat poorly drained soils that formed in loamy and sandy material; on till plains modified by lake waters. Londo-Tappan association soils are nearly level, somewhat poorly drained soils that formed as the association above. Whereas, the Wixom-Pipestone-Tappan association are found in nearly level, somewhat poorly drained soils that formed in loamy and sandy material; on outwash plains and till plains modified by lake waters. Pipestone-Tobico-Rousseau associations are nearly level to gently sloping, well drained to poorly drained soils formed in sandy material on outwash plains and beaches (Soil survey of Bay County, USDA SCS, 1980)

The predominate soil associations in the watershed are Tappan-Londo-Poseyville, followed by Londo-Tappan and then Wixom-Pipestone-Tappan. The first two soil associations work well for the agricultural industry, if drained properly. The latter soil association does well as woodland or pasturelands. These associations

The rate that water infiltrates into the soil and moves through the soil affects the amount of runoff leaving a site. The infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which the water moves through the soil and is controlled by the soil layers. In general, when the rate of infiltration and transmission through the soil is higher, the volume of runoff is lower.

Fine textured soils, such as clay, produce higher runoff volume than do coarse textured soils, such as sand. Sites having clay soils may require the construction of more elaborate drainage systems that sites having sandy soils.

Soil scientists have assigned all soils to one of four hydrologic soil groups based infiltration and transmission rates, the four groups are:

Group A Soils: High infiltration rate, low runoff potential. Well drained to excessively drained sands or gravelly sands, and a high rate of water transmission.

Group B Soils: When thoroughly wet, but not saturated, these soils display moderate infiltration rates, moderately well to well drained, and have a soil that is moderately fine to medium coarse in texture with a moderate rate of water transmission.

Group C Soils: These soils have slow infiltration and transmission rates and high runoff volume when wet. They have a layer that impedes downward movement of water consisting of moderately fine to fine texture.

Group D Soils: Very slow infiltration rate, high runoff potential. Clays with high shrink/swell potential, permanent high water table, clay pan or clay layer at or near the surface, shallow over nearly impervious material and very slow rate of water transmission.

The infiltration and transmission rates and runoff volumes of all soils are affected by climatic conditions such as freezing. Regardless of its hydrologic soil group all frozen soils have high runoff rates and volumes. Of the soils in the watershed they vary based on location, typically the soils around the South Branch and Main Branch are heavier soils, whereas the soils become "lighter" in the northern reach of the watershed. Over 85% of the occurring soils in the watershed area are classified by the USDA as poorly drained.

Table X. Hydrologic Soil Groups in the Watershed

Soil type	Hydrologic Soil Group (HSG)
Londo	C
Pipestone	B
Poseyville	C
Rousseau	A
Tappan	D/B
Tobico	D/A
Wixom	B

A substantial amount of the soils in lower reaches and around the Main Branch are C or D types and if drained well are suited as productive agriculture soils. These soils present a challenge for best management practices requiring infiltration. For example, rain gardens, bio-swales, infiltration strips and other practices to recharge groundwater do not work well and must be designed with a system to provide for slow drainage of the soils to work properly. When looking at the soil groups above it is easy to determine that the watershed is a "runoff" system and allows for substantial surface drainage. Practices must be in place to filter surface runoff and delay the runoff as long as possible to prevent sediment transport and prolong baseflow as much as possible.

Wetlands

The Department of Natural Resources and Environment (DNRE) has developed a wetlands resource status and trends for this project. Based on the preliminary GIS analysis the following results were presented at a stakeholders meeting:

Table X. Wetland status and trends

	Pre-settlement Wetland Conditions	**2005 Wetland Conditions**
Total Acres of Wetland	71,968	23,264
Number of Polygons	1,461	4,160
Average size (acres)	49	5.5

Based on the data provided in the preliminary study, 32% of the original wetland acreage remains in the watershed, but there is a 68% loss of total wetland resources. In chapter 3 each of the eight sub-watersheds will be presented and prioritized based on the percentage of wetland loss.

Wetland definitions include three main components wetlands:

1. Are distinguished by the presence of water, either at the surface or within the root zone;
2. Have unique soils conditions (hydric) that differ from adjacent uplands;
3. Support vegetation adapted to wet conditions (hydrophytes) and conversely are characterized by the absence of flooding intolerant vegetation.

Wetlands are essential in a watershed, especially in a watershed that, as indicated by the soils, is essentially a “runoff” system. Long regarded as wastelands, wetlands are now recognized as important features in the landscape that provide numerous beneficial services for people and for fish and wildlife. Some of these services, or functions, include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods. These beneficial services, considered valuable to societies worldwide, are the result of the inherent and unique natural characteristics of wetlands. Wetlands affect adjacent or nearby ecosystems within a watershed. For example, wetlands can help by storing runoff to prevent flooding for downstream communities, or by removing the amount of nutrients in runoff from the watershed’s landuses.

If something has "value," then it is worthwhile, beneficial, or desirable. The value of a wetland lies in the benefits that it provides to the environment or to people, something that is not easily measured. Wetlands can have ecological, social, or economic values. Wetland products that have an economic value, such as commercial fish or timber, can be assigned a monetary value. True wetland value, however, goes beyond money. How much value does one place on the beauty of a wetland or its archeological significance? Wetland values are not absolute. What is valuable and important to one person may not be valuable to another person. As an example, the value of a wetland as duck habitat may be important to the hunter or birdwatcher but not to the farmer who owns the land. According to Act 451, Section 30301(d), wetlands “contiguous to the Great Lakes or Lake St. Clair, an inland lake or pond, or a river or stream” or “more than 5 acres in size” are regulated by the State. Construction activities are prohibited in a regulated wetland without a permit. Certain activities, such as farming and forestry, are allowed in regulated wetlands.

Fisheries of the Kawkawlin River

The North Branch of the Kawkawlin River has a wetland complex that provides for important walleye and northern pike spawning habitat during the spring of the year. There is significant interest in maintaining or improving habitat for the sustainability of this spawning region. Overall, the habitat of the North Branch is considered fair to moderately impaired per MDEQ reports. Per these reports the upper reach is homogeneous but lacks diversity of pools, riffles, and bends. Sedimentation of the existing habitat has created conditions that indicate this niche is not diverse or well balanced. In the far upper reaches of the North Branch trout have been seen during field assessments for this report indicating some good cold water habitat is present. However, restoration and preservation tasks need to occur to protect the area.

There is a walleye rearing pond on the South Branch of the Kawkawlin that has been in place for decades and has provided a substantial amount of fingerlings for planting to maintain the walleye fishery of Saginaw Bay. Water quality issues that affect the river can have detrimental effect on this economically important fish habitat. The Saginaw Bay is nationally recognized as a great walleye fishing destination and the Bay hosts substantial amateur and professional tournaments. The established tourist economy of this Great Lakes Bay Region has grown to depend on the fisheries of the local water resources. Many service oriented jobs in the region in the hotel, restaurants, marine and sporting are supported by the regions sport fishing. The Kawkawlin watershed is an integral part of this complex fishery and the Saginaw Bay's greater eco system.

A recent inland stream survey completed in August of 2008 on the South Branch of the Kawkawlin River showed the most common species were round gobies, which accounted for 45% of the catch during this survey. The yellow bullhead was the next most abundant species with 21% of the catch. Green sunfish and bluegill were present in substantial amounts. Various other species were accounted for as follows: black crappie, bluntnose minnow, blackside darter, golden shiner, largemouth bass, logperch, central mudminnow, northern pike, pirate perch, pumpkinseed sunfish, rock bass, stone cat, and yellow perch. The representation of this piscine community is typical of the warm water habitat of this part of Michigan. The study confirms the standard finding of the watershed study which was sedimentation and excessive nutrient inputs.

Recreational Opportunities

Bay County historically began as a lumbering / fishing area, when the land was cleared agriculture began to dominate. Because of its location on the Great Lakes and its establishment as a port on this lake transport system Bay City began entry into the manufacturing portion of the State's economy. Bay City had automotive parts manufacturing, heavy construction equipment manufacturing (American Brownhoist), ship building (Defoe Shipbuilding yards) and other manufacturing, support industries and service oriented jobs. The people settling in this region made use of the local water resources. Numerous marinas and yacht clubs are sustained in the county. The county also has the Bay City State Park which is a well known beach and outdoor recreation complex. There are numerous public boat launches around the county.

The Kawkawlin River's lower reach has an established suburban population that enjoys its position along the river's edge. Boat docks and mooring facilities line the lower reach. The Kawkawlin River's South Branch has a small park and launching facility for recreation boating by shallow draft watercraft. However the North and South Branches do not have a much recreational boating traffic. Some of the problems with navigation are related to low base flow, sedimentation, excessive aquatic plant growth and channel blockage.